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ABSTRACT OF THE INVENTION

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A new three-dimensional (3D) MR imaging pulse sequence can produce over 100 high-resolution, high-contrast images in as little as 6 minutes of imaging time. Without additional imaging time, this same image data can be post-processed to yield high-resolution, high-contrast images in any arbitrary orientation. Thus, this new pulse sequence technique provides detailed yet comprehensive coverage. The method of this invention relates to a preparation-acquisition-recovery sequence cycle. The first step is magnetization preparation (MP) period. The MP period can employ a series of RF pulses, gradient field pulses, and/or time delays to encode the desired contrast properties in the form of longitudinal magnetization. A data acquisition period includes at least two repetitions of a gradient echo sequence to acquire data for a fraction of k-space. A magnetization recovery period is provided which allows T1 and T2 relaxation before the start of the next sequence cycle. The MP, data acquisition and magnetization recovery steps are repeated until a predetermined k-space volume is sampled.

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